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homologous with the "balancers" of the larvæ of salamanders of the type of *Amblystoma* and *Triton.*

Thiele further shows that inasmuch as these structures are glandular with no muscular apparatus, that the terms "sucker" or "sucking disk" are misnomers as applied to these organs. A better term might be proposed for these structures in young tadpoles, and the writer would suggest that they be called *epidermal adhesive organs.*

The form of these organs differ widely in different genera of *Salientia* and will afford a valuable means of identifying the larvæ. In *Discoglossus pictus*, the adhesive organ behind the mouth is hemispherical, with a V-shaped groove on its surface, the V opening forward. In *Pelobates fuscus* the adhesive organ is Y-shaped with a Y-shaped groove on its surface and the limbs of the whole organ extending forward to embrace the angles of the mouth. In *Bufo vulgaris* the organ is V-shaped, with a V-shaped groove, and the limbs of the V come into contact with the angles of the mouth. In *Bufo viridis* the organ is cresent-shaped, not in contact with the mouth, but a little behind it, as in *Discoglossus,* and with a widely open V-shaped groove. In *Rana esculenta* and *R. fusca* there are two distinct oval adhesive organs on either side of the median line with traces of a V-shaped groove connecting them, and both are behind the mouth. In *Rana agilis* there are two separate adhesive organs, one on each side behind the mouth, and each has a slight depression on its posterior border. In *Hyla arborea* there are two circular adhesive organs close to the angles of the mouth at either side. In *Bombinator igneus* there are two oval adhesive organs behind the mouth, whicn are in close contact, and later on fuse into a single organ, both having an oval depression in the centre.—*J. A. R.*

PSYCHOLOGY.

THE COPE-MONTGOMERY DISCUSSION.—*The Theism of Evolution.*—The following is offered as a synopsis of the leading opinions maintained by the writer in a series of articles furnished by him to *The Open Court* during 1887, in reply to articles written by Dr. Edmund Montgomery:—

I. PRINCIPIA.

1. In the universe there exist both mind and matter, subject and object.

2. The evidence for the existence of mind is found in consciousness; first, of ourselves, and, second, of other living beings, whose motions, identical with those which we make under the influence of our own consciousness, convince us of their possession of it.

3. The evidence for the existence of matter is found in certain modifications experienced by our consciousness, especially in the sensations of extension and resistance.

4. Since consciousness does not exist apart from the motion of matter, we regard it as a property of the matter in motion, that is, as a property of energy.

II. FACTA.

1. The gross activity of consciousness is immediately conditioned by matter.

2. In certain of its thought-forms consciousness is not immediately conditioned by matter, but only by its past experience of matter.

3. The forms of consciousness mentioned under (2) control the direction of energy, and hence the use of matter.

4. The proof of (3) is seen in the designed movements of animals in which they direct a current of energy in order to produce a result more or less exactly adapted to satisfy the conditions demanded by a sensation.

5. As soon as a designed movement has been fully acquired, that is, so soon as the animal mechanism necessary for its production has been created, it is performed without consciousness of effort, and may be performed unconsciously, or even in a state of general unconsciousness. Therefore designed automatic acts originated in consciousness.

6. Evolution of organic types is the resultant of the interaction of subject and object, or the living organism and its environment.

7. The function of the organism *in evolution* is to produce variations in its structure as an effect of its motions.

8. The function of the environment in evolution is to impress or destroy the organism, or to restrain, permit or encourage its use; that is, to exercise natural selection.

9. The effect of this interaction, where the movements of the organism are stimulated, is to produce specialized structures and types out of generalized ones. Where the action of the organism is not stimulated, the result is to produce degenerate types.

10. It follows that organic evolution is the result, mediate or immediate, of consciousness; that is, of the interaction of conscious energy or its residua, the organic vital energies, in interaction with the environment.

11. Organic energies perform chemical syntheses and analyses, demonstrating the control of vital over chemical energy.

12. Whereas physical and chemical energies result only in dissipation of energy and integration of matter, the energy of evolution produces complication of matter for the profitable direction and storage of energy.

NOTE.

The only comment which I have to make on Dr. Montgomery's argument is this: that, while denying that conspicuousness can control energy (matter), he admits that matter controls consciousness. These two positions are logically inconsistent. If the affirmative is true of consciousness it is true of matter, and *vice versa*. On other points I can agree fully with Dr. Montgomery.—*E. D. Cope.*

III. CONCLUSIONES.

1. The function of control and construction displayed by the energy of evolution (bathmism) leads us to infer that this type of energy can control its conditions sufficiently to enable it to have a wide distribution in space and time in the universe.

2. Since the originating and controlling element of this *special* type of energy is consciousness, it is inferred that consciousness has existed prior to any given *special* inorganic type of energy.

3. As the condition of consciousness is the unspecialized or uncreated condition of energy, it is inferred that consciousness is a property of matter in an unspecialized or generalized condition in some respect.

4. Since protoplasm is not in all respects the most generalized conceivable condition of matter, it is inferred that there are physical bases of consciousness other than protoplasm.

5. It is inferred from the preceding considerations that the existence of primitive consciousness in primitive forms of matter is not only possible but probable, and this consciousness constitutes a primitive person or Deity.—*E. D. Cope.*

Summary of the Controversy between Professor Cope and Myself. —Professor Cope maintains that mind is the active agent in the organization of living beings. I maintain, on the contrary, that the mind of living beings is itself only a product or outcome of their organization.

Professor Cope's view leads him to assume as original building-material an entirely "unspecialized" kind of matter, and as builder or organizer a supreme mind or Deity inherent in such matter.

In this connection I had to point out the great dilemma of modern philosophy; the impossibility, namely, of conceiving anything mental imparting motion or direction to anything material. Leading thinkers, of almost every school, when seriously contemplating the apparent occurrence of an intercommunication between mind and matter, have declared it scientifically impossible and philosophically inconceivable. Yet, Professor Cope's entire theory of organization through mental agency rests on the flat assertion of its being a self-evident proposition, that our mind moves our body.

I further pointed out that to escape from this distracting dilemma of having on the one side a mind incapable of *naturally* acting upon matter, and on the other side matter incapable of *naturally* acting upon mind—that to escape this dead-lock in the way of a unitary or monistic conception of nature, a theory of cognition is indispensable.

By help of such a theory we become irrefragably aware that matter and motion are only perceptual signs within our own consciousness of the presence of a non-mental existent and its activity, which are stimulating our senses in specific ways. · We can be certain that what thus effects our senses is really *non*-mental in its nature; for nothing mental has power to affect our senses and to awaken specific percepts in us. This non-mental existent and its activity cannot possibly, in the remotest degree, resemble their perceptual representation in us; for how can anything non-mental resemble anything mental? Therefore, they are not in themselves what we perceptually know as matter and motion. And thus the conception of mind moving matter becomes at once irrelevant. The dualistic opposition of matter and mind is seen to be superficial, and only due to inadequte conception on our part.

These truths, yielded by the theory of cognition, I have used to explain our voluntary movements, upon which movements the entire question of the influence of our "mind" on our body actually centers.

Our veritable being has power so to affect the sensibility of an observer as to arouse its perceptual representation in him. This perception of the observer, in all its details, forms clearly part of his own consciousness; but it representatively corresponds to the characteristics of the non-mental existent, which is stimulating his senses.

Now, it is evidently the *transient activity or function* of that part of the *permanent living being* which we perceive as his nerve-system that yields to him all his conscious states.

While this functional play of inner awareness is taking place in the observed organism, the observer himself perceives nothing but motion; motion of molecules in the nerve-system, and dependent movements of peripheral parts of the organism, such as features and limbs.

"Mind" or consciousness is thus a functional outcome of the organization of living beings, and its development is found to keep strict pace with the progressive organization of living forms.—*Edmund Montgomery.—From Open Court, Chicago, March* 1, 1888.

THE RED FOX AT SCHOOL.—Nearing Ashland, Wisconsin, one May day, an Indian lad boarded the train with a basket, in which were three little red foxes (*Vulpes rufus*), their eyes just open, and handsome as little fairies. He expected a bounty for their scalps, but quickly sold one little fellow to me. Too young to know what danger was,—only as an inherited instinct, I determined to see how far he would yield to kind treatment and general domestication.

Returning to my Illinois home, he was fastened by a light chain about fifteen feet long to a pine tree near the back door. Two small dry-goods boxes, placed one above the other, with a door in the same end of each, served as a two-story kennel, the doors facing the house affording ample opportunity for observation. Too young to eat readily, we taught him to drink milk, and gradually to take tender meat, his teeth being at this time only tiny points, weaker—relatively, than a puppy's of similar age. He grew rapidly, and when feeding we held him in our laps, fondling him as a kitten, allowing him to lap and chew our fingers freely. Our shoulder came to be a favorite seat, and until too large, he liked a step still higher; later, to put his fore feet up, then repeatedly to jump from our shoulders to the ground, as we sat upon the grass. He was equally at home in the house where he was given entire liberty. It was now time that he and the cat, with her two kits, should eat and drink together and from the same dish. Kitty, accustomed to having various animals introduced into her home for observation studies, quietly accepted the inevitable. While drinking milk, of which there was always plenty, no jealousy for individual rights appeared, but as the fox grew faster than the kits, and the plate of meat sometimes seemed meager for four, he would eat as fast as possible, snuff a little, as much as to say, "go away,"—give another snuff, and not being heeded, would gently pick up one of the kittens by the nape of its neck, and carrying it off a little ways, set it down, then rush back to the dish, to find the kit there also. This being repeated two or three times, with no satisfactory results, as if out of patience, he would grow more decided and inclined to hurt them a little, making them cry, but they were never conquered. When he had had enough, and a little comparatively was sufficient, if any meat was left, even of the size of a walnut, he would dig a hole, drop it in and with his sharp nose press it down closely, then cover it, and looking about, to be sure of no witnesses, would give a flirt of pine needles over the place, till one could scarcely detect the freshly stirred earth. "Cunning as a fox." If I attempted to find it, he would stand sentinel, and as the spot was neared give a snuff of dislike, but never in his life of nearly two years attempted to bite or bark, nor did we ever see him dig up any of these buried morsels. We tried the effect of raw and cooked meats upon his disposition and found him, after a few days on raw diet, inclined to lap heavier, and chew our fingers harder, but we never feared being bitten.

He greatly enjoyed playing with the kittens but they, being so much smaller and weaker, would tire more quickly and start off to play by themselves. An artifice was at hand to coax them back. Going nearly to the end of his chain, and facing the inside of the circle, though with a keen eye to the outside, he would quietly wag his tail back and forth in the grass. This motion was too great a temptation for the kits who would chase it, when quick as a flash, he would turn and grasp one, without hurting it but with *such* a look of pleasure and conquest. This feat would be accomplished frequently till all preferred rest or another pastime.

An apple tree stood near the pine, and the young fruit fell freely. With these apples the fox would amuse himself by the hour, playing ball, tossing them and running after them, or tossing them up and catching them in his mouth, also chasing the leaves as they fell to the ground, but he never inclined to gather any materials to make a nest, nor to eat the sour apples.

For persons, he manifested great preferences, and the children who came daily to play with him were no exception. From some, he would take almost anything, especially enjoying a play with their hair as they lay in the grass with him, or to lick their faces and feet, from others he required due reserve, though he never attempted to bite, but often snuffed at them, and held his mouth slightly open, as a cat will, when some disagreeable odor is perceived. When a stranger appeared he was manifestly "foxy," running away as far as he could, and was not readily coaxed by dainty morsels, until some friend came, by whose manner he was assured. My aged grandfather was always kind to him, though in heart he accused him of possible treachery. Did the fox detect this, or why did he in turn always manifest a marked distrust in him? Like a dog, he recognized the foot fall of his friends at a long distance, and would start up and wait for their approach, manifesting great joy on their arrival.

That summer we had a coop of early chicks near the door and for their safety we feared, but soon found that as the fox was sufficiently fed at meal time, these were no temptation to him, and they could pick up crumbs in safety within his own circle.

On several occasions, in his gambols, he broke his chain. Indoors he was readily caught, but when loose out doors, he lost all judgment and did not recognize his surroundings. The yard being large with much shrubbery, to catch him was no trifle, and his instinct to "cover his track" became apparent, often leaping several feet to one side of his course, retracing his steps some distance, then leaping off to one side, or concealing himself behind a bush. When once caught and in our arms, or returned to the house, or his kennel, he could not sufficiently express his joy, lapping our hands and faces, rolling over and over, turning summersaults, etc., etc., in rapid succession. Never was a lost dog happier to find his home than the fox to find his.

At an early age he manifested a slight tendency to burrow, but always in the same place, by the side of his kennel, digging it out and filling it up again, but never, even as winter approached, did he make a space long enough for his body, nor deep enough to conceal himself, rather, only a shallow trench. Was this lack of provision for the future a direct result of domestication? In summer he often lay in this hollow, but his favorite sleeping place, even in mid-winter was on top of the highest box, the wind playing generally in his long, thick and fine hair. Was this position and his love for sitting on our shoulders or any elevated place a remnant of some arboreal strain? At twilight and by moonlight was his play time, turning summersaults, rolling over and over, jumping from the second story to the first and then to the ground and back, or entirely over his kennel, etc., etc., but though always on the alert, we never noticed anything which indicated discontent or fear, only as strangers came near him.

We tried to teach him various tricks, but for these he developed little aptness, except to return a stick when thrown and to play hide and seek with the children, he appreciating the point quite as much from his standpoint as they from theirs, but a faculty for long continuance at such acquired games was wholly lacking in his nature. When in the house he paid little more attention to the tones of the piano than a dog, though when very rapid and loud numbers were executed he would look earnestly, but not anxiously. With singing and whistling he was always familiar, but the only appreciation he manifested of either was a glad recognition of the voices of his friends; to a scolding tone, or any reprimand directed to him he was very susceptible, closing his eyes as meekly as a dog when reproved. As he seemed to have attained his maximum in mental capacity, and the object of our study had been secured, the second winter he was passed over to the taxidermist; but for a year, whenever the earth about the pine was stirred, the peculiar odor of the fox was evident, though in playing with him on the grass we rarely detected it.—*Mary E. Holmes, Ph.D.*, Rockford, Ills.

CANINE DISSIMULATION.—Mr. John F. Stafford, of Chicago, owns an English Bull Terrier about two years old. "Shave" is indulged considerably by his master, and occasionally allowed to remain indoors if the weather is bad.

Once Shave had a severe cold and coughed considerably, during which time he was allowed to stay in the house.

Since his recovery when any mention is made of turning him out of doors he coughs vigorously, and wheezes, in fair imitation of asthma.

The trick does not avail him now, however, but he recollects that it did once. When put out he drops the pretence at once and dashes gaily off after neighborhood company.

Shave's mother, it is said, used to ring an electric bell by pressing upon the button in the floor when she wanted to go out. There is a chance for this to be accidental, but the family believe that it is intentionally done. The coughing trick I witnessed once in Shave, and Mr. Stafford says it is often resorted to by the hypocrite.—*S. V. Clevenger.*